

western Oregon and Washington. In the upper lake region eighteen inches were reported in extreme northern Michigan and north-central Wisconsin; in the Red River of the North valley, sixteen inches at Saint Vincent, Minn.; in South Dakota and northern Nebraska, two to eight inches; in west-central and northwestern Colorado, eight to twenty inches; in the middle and northern plateau regions the amount varied from over forty inches in northeastern Nevada to thirty inches in southeastern Wyoming, to sixteen inches in eastern Washington, to fifteen inches near Carson City, Nev., to twelve inches in southeastern Utah, and in northeastern California a depth of twenty-one inches was reported.

#### HAIL.

Hail was reported during the month as follows: 4th, Cal., Nev. 5th, Md., N. Y., Pa. 6th, N. Y. 8th, Cal. 9th, Wash. 10th, Ill., Ind., Iowa, Kans., Ky., Mich., Mo., N. Y., Ohio, Wis. 11th, and 12th, Cal. 14th, Ind., N. J., N. Y., Ohio,

Pa. 16th, N. C. 18th, Cal., Wash. 19th, Nebr., Oregon, Wash., Wis. 20th, Cal., Oregon. 21st, Cal., Ill., Iowa, Kans., Minn., Mo., Tenn. 22d, Cal., Mass., N. Y. 23d, Mass., Ohio. 24th, Mass., N. Y. 25th, Cal., Mass. 26th, N. Y., Pa. 28th, Iowa, Nebr., S. Dak. 29th, Iowa, Mass. 30th, Md., Ohio, Va. 31st, Iowa, Ohio, Va.

#### SLEET.

Sleet was reported as follows: 1st, Wis. 3d, N. Dak., Pa., S. Dak. 4th, Minn., Wis. 5th, Mich., N. J., N. Y., Ohio, Pa. 6th, Conn., N. J., Vt. 8th, N. Dak., Utah. 9th, N. Dak. 10th, Mass., N. Y., Wis. 11th, Utah, Vt. 13th, Vt. 14th, N. J., Pa., Vt., Wis. 15th, Pa., Vt. 16th, Kans., Minn., N. Dak. 19th, Ill., Iowa, Nebr., Utah, Wis. 20th, Wis. 21st, Iowa, Wash., Wis. 22d, N. H., N. Y., Vt. 23d, Mass. 24th, Conn., Mass. 26th, Conn., N. Y., Vt., Wash. 27th, Utah. 28th, Colo., Minn., Nebr., S. Dak., Wis. 29th, Colo., Iowa, Minn., Oregon, Pa., Tenn., Vt., Wis. 31st, Ariz., Iowa, N. C.

#### WINDS.

The prevailing winds during December, 1889, are shown on chart ii by arrows flying with the wind. In New England, the prevailing winds were from the northwest to west; in the middle Atlantic and east and west Gulf states, the upper Mississippi and Missouri valleys, and over the northern plateau region, southeast to southwest; in the south Atlantic states and on the northeastern slope of the Rocky Mountains, west to southwest; in Florida, northeast to northwest; in the Rio Grande Valley, and on the middle Pacific coast, southeast; in the Ohio valley and Tennessee, and on the southeastern slope of the Rocky Mountains, south to southwest; in the lower lake region, southwest; in the upper lake region, and over the middle plateau region, south to west; in the extreme northwest, north to northwest; on the middle-eastern slope of the Rocky Mountains, south to northwest; on the north Pacific coast, south to southeast; on the south Pacific coast, east to northeast; and over the southern plateau, variable.

#### HIGH WINDS (in miles per hour).

Maximum velocities of fifty miles, or more, per hour were reported at regular stations of the Signal Service as follows: 2d, 51, sw., at Wood's Holl, Mass. 6th, 52, sw., at Whipple

Barracks (Prescott), Ariz. 7th, 50, sw., at Whipple Barracks (Prescott), Ariz. 10th, 50, sw., at Lexington, Ky. 14th, 60, ne., at Block Island, R. I. 15th, 54, s., at Whipple Barracks (Prescott), Ariz. 16th, 56, se., at Fort Canby, Wash. 19th, 60, se., at Fort Canby, Wash. 20th, 56, w., at Buffalo, N. Y. 22d, 50, sw., at Port Huron, Mich.; 72, w., at Buffalo, N. Y.; 54, w., at Rochester, N. Y.; and 56, w., at Grand Haven, Mich. 26th, 54, w., at Boston, Mass.; 54, nw., at Block Island, R. I.; 65, w., at Buffalo, N. Y.; 57, w., at Port Huron, Mich.; 54, w., at Harrisburg, Pa.; and 52, w., at Oswego, N. Y. 27th, 60, nw., at Wood's Holl, Mass.; and 50, se., at Fort Canby, Wash. 28th, 60, s., at Dodge City, Kans. 29th, 66, w., at Buffalo, N. Y.; 51, sw., at Grand Haven, Mich.; and 67, sw., at Port Huron, Mich. 31st, 54, s., at Dodge City, Kans.

#### LOCAL STORMS.

Heavy thunder-storms were reported near Cambridge, Ind., on the 11th, and at Buffalo, N. Y., on the 22d. Destructive gales were reported at Jeannette, Pa., on the 11th; over the lower lake region on the 22d; over New England and the lake region on the 26th; on the middle Atlantic and New England coasts on the 27th; at Fort Sully, South Dakota, on the 28th; and at Port Huron, Mich., on the 29th.

#### INLAND NAVIGATION.

##### CLOSING OF NAVIGATION.

*Lake Michigan.*—Grand Haven, Mich.: navigation closed for the season on the 1st, but steamers will run between this port and Milwaukee throughout the winter. Chicago, Ill.: navigation closed for the season on the 15th.

*Green Bay.*—Green Bay, Wis.: navigation was practically closed for the season on the first.

*Lake Superior.*—Duluth, Minn.: navigation closed for the season on the 4th.

*Kennebec River.*—Augusta, Me.: the river froze over on the night of the 3d–4th from this city to Merry Meeting Bay, and reports from Gardiner, Me., stated that the river also froze over at that point.

*Saint Olair River.*—Port Huron, Mich.: the last boats of the season, en route from Chicago to Buffalo, passed this port on the 11th.

*Saint Mary's River.*—Sault de Ste. Marie, Mich.: navigation closed for the season on the 4th.

*Missouri River.*—Yankton, S. Dak.: navigation opened on the 8th. The river froze over on the 28th, closing navigation.

*Mississippi River.*—Saint Paul, Minn.: the ice-gorge in the river disappeared early in the morning of the 8th, and the

channel was clear as far as the eye could reach. A small gorge formed during the night of the 19–20th, and another during the night of the 26–27th. Davenport, Iowa: owing to an ice gorge which formed above this place, the stage of the water on the 1st and 2d, 0.2 and 0.3, respectively, below low-water mark, was the lowest on record, the former lowest mark being zero, in 1878. La Crosse, Wis.: the river was nearly clear of ice on the 2d, and the ferry boat resumed her trips; floating ice 25th to 27th. The ferry boat stopped running on the 29th. The river was frozen over on the 30th, on which date the water was reported the lowest ever known.

#### FLOODS.

Heavy and continuous rains caused destructive floods in California and parts of Nevada and Arizona, and heavy rain caused the rivers at Johnstown, Pa., to rise to a dangerous height on the 14th. On the 12th the Sacramento River at Sacramento, Cal., was the highest ever known, the gauge reading being twenty-six feet eleven and one-half inches; the highest previous reading was twenty-six and six-tenths feet, in February, 1881. The levee opposite Sacramento broke, flooding a great part of Yolo county. Colusa county sustained greater damage than any of the surrounding sections,